100

103

102

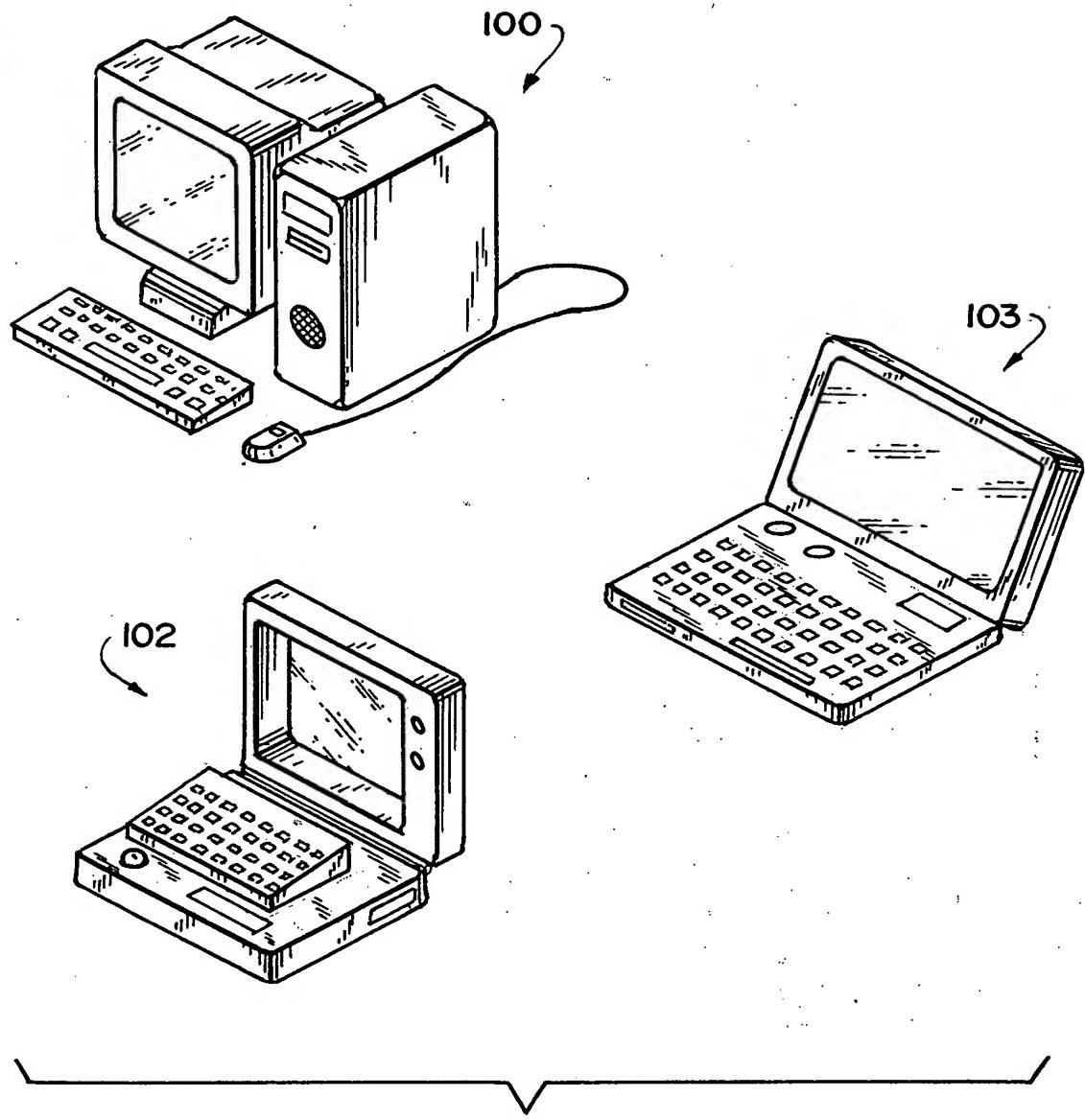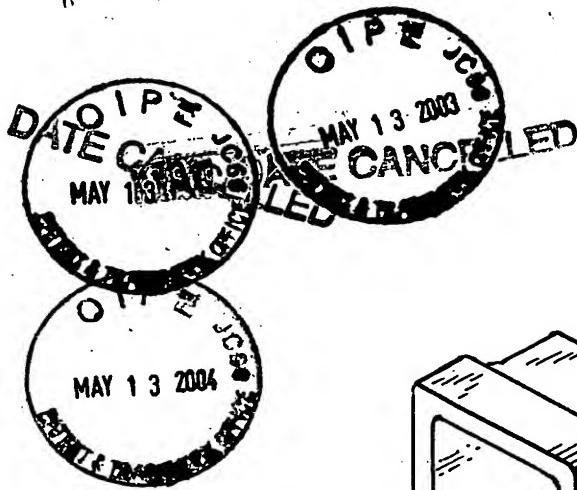**FIG.I**

201 — STUDENT (SID, SNAME, MAJOR)

CLASS (CID, CNAME, TIME, ROOM)

STUDENT__CLASS (SID, CID)

OLD WAY-USE STUDENT__CLASS TO MODEL RELATIONSHIP

202 — STUDENT (SID, SNAME, MAJOR, CIDBS)

CLASS (CID, CNAME, TIME, ROOM, SIDBS)

NEW WAY- USE BITSETS CIDBS AND SIDBS TO MODEL RELATIONSHIP

FIG.2

401 — OLD WAY

CATEGORY (CATEGORYID BIGINT)
DOCUMENT (DOCUMENTID BIGINT)
PARENT_CHILD ASSOCIATIONS (CHILDID BIGINT, PARENTID BIGINT)

402 — NEW WAY

CATEGORY (CATEGORYID BIGINT, BSDOCUMENT BITSET, BSPARENT BITSET, BSCHILD BITSET)

DOCUMENT (DOCUMENTID BIGINT)

FIG.4

BRAND:

FAMILY:

MACHINE TYPE:

MODEL NUMBER:

PRODUCT INSTANCES:

I3 IBM INTELLI STATION — 1,2,3,4,5,6,7,8,9 10,11,12,13

I1,I2 INTELLI STATION MPRO — 1,2,3,4,5,6,7,8,9 10,11,12,13

INTELLISTATION ZPRO

INTELLISTATION EPRO

6897 — 9,10

6889 — 6,7 — 1,2,3,4,5,6,7, 11,12,13

6868 — 8

15V — 4,5 — 3,6,7,11 12,13

15U — 3 — 3,6,7,11, 12,13

15K — 1,2 — 1,2,6,7,11, 12,13

23H3471 6889-15U — 3,6,7,11, 12,13

23H3470 6889-15U — 3,6,7,11, 12,13

FIG.3

FIG.5

NOR RULES: INPUT ALL FALSE ⇒ OUTPUT TRUE

| INPUT TRUE EXPRESSIONS | ANDISEMPTY EVALUATES TO FALSE | RETURNS FALSE NOR RULES |
| INPUT FALSE EXPRESSIONS + OPTIONAL | ANDEQUALS EVALUATES TO TRUE | RETURNS TRUE NOR RULES |

OR RULES: INPUT ALL FALSE ⇒ OUTPUT FALSE

| INPUT TRUE EXPRESSIONS | ANDISEMPTY EVALUATES TO FALSE | RETURNS TRUE OR RULES |
| INPUT FALSE EXPRESSIONS + OPTIONAL | ANDEQUALS EVALUATES TO TRUE | RETURNS FALSE OR RULES |

NAND RULES: INPUT ALL TRUE ⇒ OUTPUT FALSE

| INPUT TRUE EXPRESSIONS + OPTIONAL | ANDEQUALS EVALUATES TO TRUE | RETURNS FALSE NAND RULES |
| INPUT FALSE RULES | ANDISEMPTY EVALUATES TO FALSE | RETURNS TRUE NAND RULES |

AND RULES: INPUT ALL TRUE ⇒ OUTPUT TRUE

| INPUT TRUE EXPRESSIONS + OPTIONAL | ANDEQUALS EVALUATES TO TRUE | RETURNS TRUE AND RULES |
| INPUT FALSE EXPRESSIONS | ANDISEMPTY EVALUATES TO FALSE | RETURN FALSE AND RULES |